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| 10/055,159 | 01/23/2002 | Larry W. Bowman | 60,130-1275 (01MRA0541) | 9557 |

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| ART UNIT | PAPER NUMBER |
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3681

DATE MAILED: 03/18/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.
10/055,159

Applicant(s)
Bowman

Examiner
Sherry Estremsky

Art Unit
3681



-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on _____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above, claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on Jan 23, 2002 is/are a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
*See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s). 2 and 3 6) ☐ Other:

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DETAILED ACTION

Information Disclosure Statement

1. Two information disclosure statements have been received in the application. It has been noted that each statement includes a single sheet of form PTO/SB/08B labeled "sheet 1 of 2". It has been assumed that there is actually only one sheet of the form per statement, and that the label indicating two sheets is in error.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 3-12 and 15-20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In the last two lines of claim 3, "each gear in said gear pair is supported on a common shaft" is unclear. This appears to be claiming two shafts, one for each gear in a pair of gears. It is not clear what each shaft is common with, since only a single gear (each gear) is claimed as supported on each shaft. Additionally, it is not clear which of the multiple gear pairs is "said gear pair". It appears "each gear in said gear pair is supported on a common shaft" should be --the gears in each of said gear pairs are supported on a common shaft--.

The last line of claim 15 is similarly unclear.

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The last two lines of claim 10 incorrectly claim the disclosed invention by claiming that it is the spider supporting the shafts that connects the inner gears to the outer gears ("said spider supports said shafts...to rigidly connect said inner gears to said outer gears").

Lines 2 and 3 of claim 20 similarly claim the disclosed invention incorrectly.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-9, 13, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Knobloch et al., U. S. Patent 3,737,000 in view of Tappan et al., U. S. Patent 4,040,312.

Knobloch et al. shows in figure 2 an electronic drive unit assembly.

Non-rotating spindle 48 has an interior chamber and is mounted to a vehicle structural component 38.

Wheel hub 24 is supported on at least one bearing 96 for rotation relative to the spindle about an axis of rotation and includes an interior hub chamber.

An electric motor 42 (column 1, lines 14-16) is mounted partially within the interior chamber and has an output shaft 46 operatively coupled to drive the wheel hub 24 about the axis of rotation.

(claim 1)

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The assembly includes a reduction gear assembly mounted within the wheel hub 24 (hub chamber) having an input 150 operatively coupled to the output shaft 46 and an output 30 operatively coupled to the wheel hub 24.

(claims 2 and 13)

The reduction gear assembly includes a plurality of inner gears 120 operatively coupled to the input 150 and a plurality of outer gears 122 coupled to the output 30 (column 3, lines 51-55). Each one of the inner gears 120 has a corresponding outer gear 122 to form a gear pair. The gears in each of the gear pairs is supported on a common shaft 116 such that the gears rotate at a common speed.

(claim 3)

As shown by the table in column 5, the inner gears 120 have a first predetermined (according to the desired gear ratio) number of teeth (25) and the outer gears have a second predetermined number of gear teeth (28-33) that is different than the first number of gear teeth.

(claim 4)

The input 150 is a sun gear mounted for rotation with the output shaft 46, and the output 30 is an outer ring gear mounted to the wheel hub 24. The inner gears 120 are in meshing engagement with the sun gear 150, and the outer gears 122 are in meshing engagement with the outer ring gear 30.

(claim 5)

The shafts 116 from each of the gear pairs are mounted to a common spider 114 that rotates about the axis of rotation.

(claim 6)

The spider 114 is rotatably supported on a bearing surface 144 such that the sun gear 150 and the spider can rotate at different speeds relative to each other.

(claim 7)

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An inner ring gear 26 is mounted to the spindle 48, and the inner gears 120 are in meshing engagement with the inner ring gear 26.

(claim 8)

The inner ring gear 26, the sun gear 150, the spider 114, and the outer ring gear 30 are concentric.

(claim 9)

The reduction gear assembly includes an inner ring gear 26 mounted to the spindle 48 and operatively coupled to the input 150 and an outer ring gear 30 mounted to the wheel hub 24 and operatively coupled to the output.

(claim 14)

Knobloch et al. does not disclose that the motor 42 is within the interior chamber.

Tappan et al. discloses a drive unit assembly similar to that of Knobloch et al, including a non-rotating spindle 12 having an interior chamber, a wheel hub 13 supported one at least one bearing 77 for rotation relative to the spindle, and a motor 11 having an output shaft 23 operatively coupled to drive the wheel hub 13. The motor 11 is mounted within the interior chamber.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Knobloch et al. to mount the motor within the interior chamber in view of Tappan et al. because such an arrangement results in a wheel hub that is typically 30 to 40% shorter than wheel hubs of the same output torque capacity with axially disposed motors, and the arrangement also results in the hub bearings being disposed about the motor, so that they have a larger diameter and load capacity than the hub bearings used in arrangements having axially disposed motors (Tappan et al., with specific reference to improvement over the Knobloch et al. 3,737,000 patent -- column 1, lines 13-28 and column 5, lines 21-32).

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6. Claims 15-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Knobloch et al. in view of Tappan et al. as applied to claims 13 and 14 above, and further in view of Rosen, U. S. Patent 4,280,376.

Knobloch et al. in view of Tappan et al. discloses an electronic drive unit assembly as discussed above in the rejection of claims 13 and 14, including the non-rotating spindle, wheel hub, reduction gear assembly, and electric motor.

The reduction gear assembly (as disclosed in Knobloch et al.) includes a plurality of inner gears 120 in meshing engagement with the inner ring gear 26 and a plurality of outer gears 122 in meshing engagement with the outer ring gear 30. Each of the inner gears 120 has a corresponding outer gear 122 to form a plurality of gear pairs. The gears of each gear pair are mounted to a common shaft 116.

(claim 15)

As shown in the table in column 5 (of Knobloch et al.), the inner gears 120 have a first predetermined number of gear teeth and the outer gears have a second predetermined number of gear teeth that is different than the first number of gear teeth.

(claim 16)

The input 150 is a sun gear mounted for rotation with the output shaft 46 and in meshing engagement with the inner gears 120.

(claim 17)

The assembly includes a spider 114 that supports the shafts 116 from each of the gear pairs such that each gear pair rotates with the spider about the axis of rotation.

(claim 18)

The spider 114 is rotatably supported on a bearing surface 144 such that the sun gear 150 and the spider 114 can rotate at different speeds relative to each other.

(claim 19)

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Though the inner and outer gears 120 and 122 of Knobloch et al. are rigidly connected to each other, Knobloch et al. in view of Tappan et al. does not teach each pair of inner and outer gears being rigidly mounted on the common shaft such that the shaft rigidly connects the inner gears to the outer gears (limitations of claims 15 and 18).

Rosen discloses a manner of constructing a reduction gear assembly similar to the reduction gear assembly disclosed in Knobloch et al, including plural gear pairs (inner and outer gears) 22/24 each mounted on a common shaft 20, a spider 28 supporting the shafts, an input sun gear 16, a fixed ring gear 12, and an output ring gear 32. Each of the gears in the gear pairs is rigidly mounted to its respective shaft such that the shaft rigidly connects each inner gear to its corresponding outer gear.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Knobloch et al. in view of Tappan et al. to rigidly mount the gear pairs to the shafts in view of Rosen because such a construction allows the shaft to be mounted in the spider in a manner that compensates for eccentric tolerances in the assembly, resulting in load equilibrium (Rosen, column 2, line 64 to column 3, line 3 and column 5, lines 37-44).

7. Claims 1-3, 13, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kamlukin, U. S. Patent 6,080,077 in view of Tappan et al.

Kamlukin discloses in figure 8 an embodiment of an electronic drive unit assembly.

Non-rotating spindle 38' is mounted to a vehicle structural component (column 3, lines 15-19) and has an interior chamber.

Wheel hub 76' is supported on at least one bearing 84' for rotation relative to the spindle 38' about an axis of rotation and defines an interior hub chamber.

Electric motor 22 (figure 1) has an output shaft 20' operatively coupled to drive the wheel hub 76' about the axis of rotation.

(claim 1)

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A reduction gear assembly is mounted within the wheel hub 76' (hub chamber) and has an input 44 operatively coupled to the output shaft 20' (column 3, lines 30-36) and an output 74' is operatively coupled to the wheel hub 76'.

(claims 2 and 13)

The reduction gear assembly includes a plurality of inner gears 68' operatively coupled to the input 44 and a plurality of outer gears 70' coupled to the output 74'. Each one of the inner gears 68' has a corresponding outer gear 70' to form a gear pair. The gears in each of the gear pairs is supported on a common shaft 64' such that the gears rotate at a common speed.

(claim 3)

An inner ring gear 40' is mounted to the spindle 38' and operatively coupled to the input, and an outer ring gear 74' is mounted to the wheel hub 76' and operatively coupled to the output.

(claim 14)

Kamlukin does not disclose that the motor is mounted within the interior chamber of the spindle.

Tappan et al. also discloses a drive unit assembly with a non-rotating spindle 12, a wheel hub 13, a reduction gear assembly 15, and a motor 11. The motor 11, which would be supplied to each wheel hub of a vehicle, is mounted within the interior chamber of the spindle.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Kamlukin to mount the motor within the interior chamber in view of Tappan et al. because such an arrangement is useful in applications such as heavy duty vehicles requiring low speed, very high torque output (Tappan et al., column 3, lines 44-51), and the arrangement also results in the hub bearings being disposed about the motor, so that they have a larger diameter and load capacity than the hub bearings used in arrangements having axially disposed motors (Tappan et al., column 5, lines 21-32).

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8. Claims 4, 10-12 rejected under 35 U.S.C. 103(a) as being unpatentable over Kamlukin in view of Tappan et al. as applied to claims 1-3 above, and further in view of Knobloch et al.

Kamlukin in view of Tappan et al. discloses an electronic drive unit assembly as discussed above in the rejection of claims 1-3, including a non-rotating spindle, a wheel hub, and an electric motor.

Kamlukin discloses that the inner gears 68' and the outer gears 70' have different pitch diameters, but not different numbers of teeth.

The input (as disclosed in Kamlukin) is a spider 46 (compare with figure 2 - plate 44 is the central portion of spider 46) in driving engagement with the output shaft 20'. The output 74' is an outer ring gear mounted to the wheel hub 76'. The spider 46 supports the shafts 64' from each of the gear pairs, in which the inner gears are rigidly connected to the outer gears, such that each gear pair rotates with the spider 46 about the axis of rotation.
(claim 10)

An inner ring gear 40' is mounted to the spindle 38' and the inner gears 68' are in meshing engagement with the inner ring gear 40' and the outer gears 70' are in meshing engagement with the outer ring gear 74'.
(claim 11)

The inner ring gear 40', the spider 46, and the outer ring gear 70' are concentric.
(claim 12)

Kamlukin in view of Tappan et al. does not disclose that the inner gears and the outer gears have different numbers of teeth (limitation of claim 4).

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Knobloch et al. discloses a similar electronic drive unit assembly with a non-rotating spindle, a wheel hub, and an electric motor. A reduction gear assembly transmitting rotation from the motor 42 to the hub 24 includes a plurality of inner gears 120 and a plurality of outer gears 122 mounted on common shafts 116. The inner gears 120 have a first predetermined number of teeth and the outer gears 122 have a second predetermined number of teeth different than the first number of teeth (table in column 5).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Kamlukin in view of Tappan et al. to make the inner gears and outer gears to have different numbers of teeth in view of Knobloch et al. because it is possible with that arrangement to change some of the gears for gears with different numbers of gear teeth, without having to change all of the gears, to achieve different gear ratios (Knobloch et al., column 5, lines 4-31).

9. Claims 15, 16, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kamlukin in view of Tappan et al. as applied to claims 13 and 14 above, and further in view of Knobloch et al and Rosen.

Kamlukin in view of Tappan et al. discloses an electronic drive unit assembly as discussed above in the rejection of claims 13 and 14.

The reduction gear assembly, as disclosed in Kamlukin, includes a plurality of inner gears 68' in meshing engagement with the inner ring gear 40' and a plurality of outer gears 70' in meshing engagement with the outer ring gear 74'. Each of the inner gears 68' has a corresponding outer gear 70' to form a plurality of gear pairs mounted on common shafts 62'.
(claim 15)

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Kamlukin in view of Tappan et al. does disclose that the inner and outer gears have different pitch diameters, but does not disclose that the inner gears and the outer gears have different numbers of teeth.

Knobloch et al. teaches providing the inner gears and outer gears with different numbers of teeth as discussed above in the rejection of claim 4, which includes the same limitations as claim 16.

(claim 16)

The input is a spider 46 in direct driving engagement with the output shaft 20'. The spider supports the shafts 64' from each of the gear pairs, in which the inner and outer gears are rigidly connected, such that each gear pair rotates with the spider about the axis of rotation.

(claim 20)

Though the inner and outer gears 68' and 70' of Kamlukin are rigidly connected to each other, they are not connected by being rigidly mounted on the shafts 64'.

Rosen discloses a manner of constructing a reduction gear assembly similar to the reduction gear assembly disclosed in Kamlukin, including plural gear pairs (inner and outer gears) 22/24 each mounted on a common shaft 20 and a spider 28 supporting the shafts. Each of the gears in the gear pairs is rigidly mounted to its respective shaft such that the shaft rigidly connects each inner gear to its corresponding outer gear.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Kamlukin in view of Tappan et al. to rigidly mount the gear pairs to the shafts in view of Rosen because such a construction allows the shaft to be mounted in the spider in a manner that compensates for eccentric tolerances in the assembly, resulting in load equilibrium (Rosen, column 2, line 64 to column 3, line 3 and column 5, lines 37-44).

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Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U. S. Patent 1,311,310 (Bouton) July 1919 - discloses a hub drive unit with a reduction gear assembly having an input spider, a fixed inner ring gear, an output ring gear, and inner and outer gears supported on a common shaft.

U. S. Patent 3,477,547 (Kress et al.) November 1969 - discloses a drive unit assembly with a non-rotating spindle, a wheel hub, a reduction gear assembly within the hub, and a motor mounted within the spindle. The gear assembly includes an input sun gear, a fixed inner ring gear, an output ring gear, and inner and outer gears supported on a common shaft.

U. S. Patent 4,092,878 (Campbell) June 1978 - discloses a drive unit assembly with a wheel hub, a reduction gear assembly within the hub, and a motor. The gear assembly includes an input sun gear, a fixed inner ring gear, an output ring gear, and inner and outer gears supported on a common shaft.

U. S. Patent 4,116,294 (Fukui) September 1978 - discloses a drive unit assembly with a non-rotating spindle, a wheel hub, a reduction gear assembly within the hub, and a motor mounted within the spindle. The gear assembly is that same as that disclosed by Knobloch et al., including bearing surfaces 17/17' which correspond to the bearing surfaces 144 of Knobloch et al., and which support the spider for rotation.

U. S. Patent 4,873,894 (Avery et al.) October 1989 - discloses a drive unit assembly with a non-rotating spindle, a wheel hub, and a reduction gear assembly within the hub. The gear assembly includes an input sun gear, a fixed inner ring gear, an output ring gear, and inner and outer gears rigidly supported on a common shaft.

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U. S. Patent 5,435,794 (Mori et al.) July 1995 - discloses a hub drive unit with a fixed spindle within which a motor is mounted and a reduction gear assembly having an input spider, a fixed inner ring gear, an output ring gear, and a gear which meshes with the fixed ring gear at one end and meshes with the output ring gear at its other end and which is supported for rotation with the spider.

FACSIMILE TRANSMISSION

11. Submission of your response by facsimile transmission is encouraged. Group 3600's facsimile number is **(703) 305-3597**. Recognizing the fact that reducing the cycle time in the processing and examination of patent applications will effectively increase a patent's term, it is to your benefit to submit responses by facsimile transmission whenever permissible. Such submission will place the response directly in our examining group's hands and will eliminate Post Office processing and deliver time as well as the PTO's mail room processing and delivery time. For a complete list of correspondence **not** permitted by facsimile transmission, see MPEP 502.01. In general, most responses and/or amendments not requiring a fee, as well as those requiring a fee but charging such fee to a deposit account, can be submitted by facsimile transmission. Responses requiring a fee which applicant is paying by check **should not be** submitted by facsimile transmission separately from the check.

Responses submitted by facsimile transmission should include a Certification of Transmission (MPEP 512). The following is an example of the format the certification might take:

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(Signature)

If your response is submitted by facsimile transmission, you are hereby reminded that the original should be retained as evidence of authenticity (37 CFR 1.4 and MPEP 502.02). Please do not separately mail the original or another copy unless required by the Patent and Trademark Office. Submission of the original response or a follow-up copy of the response after your response has been transmitted by facsimile will only cause further unnecessary delays in the processing of your application; duplicate responses where fees are charged to a deposit account may result in those fees being charged twice.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sherry Estremsky whose telephone number is (703) 308-2164. The examiner can normally be reached on Monday through Thursday from 7:30 a.m. to 6:00 p.m.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Charles Marmor, can be reached at (703) 308-0830. The fax phone number for this Group is (703) 305-3597.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-2168.

SLE

(703) 308-2164

March 13, 2003


SHERRY ESTREMSKY
PRIMARY EXAMINER
AU3681 3-13-03